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PATENT
Atty. Docket No. INK-067
(2108/56)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S):	Wilcox *et al.*	Confirmation No.:	7307
SERIAL NUMBER:	09/464,264	ART UNIT:	2623
FILING DATE:	December 17, 1999	EXAMINER:	M. Miller
TITLE:	Electronic Ink Display Media for Security and Authentication		

AMENDMENT AND RESPONSE

Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Office Action mailed November 20, 2002 (the "Office Action"), in connection with the above-identified patent application, Applicants respectfully submit the following Amendment and Response.

A petition for extension of time up to and including March 20, 2003, and the extension fee are submitted with this paper. Applicants believe that no other fees are due, but the Commissioner is hereby authorized to charge any additional fees to Deposit Account No. 20-0531.

AMENDMENT

In the Written Description

Please substitute the paragraph bridging pages 27 and 28 with the following paragraph where the marking shows the amendment:

Referring to FIGS. 7A and 7B, in one embodiment, an object 301 with an authentication marker 300 is created by disposing a first electrode 310 on the object 301 by printing or other suitable means and disposing an electrophoretic display medium 320 on the first electrode 310 by printing or other suitable means. The display medium 320 has a blocking display state 322 that does not reveal a message that indicates authenticity. The message may be disposed on the first electrode 310 or on a surface 350 of the object 301 beneath the first electrode 310. Alternatively, the message may be formed by a pattern formed by the display medium 320 or first electrode 310. The blocking display state 322 may, for example, be opaque, reflective or a color which hides or obscures the message. Referring to FIGS. 7B and 7C, a second electrode 330 is used to apply a first electrical field between the electrodes 330, 310. The second electrode 330 may be a charged stylus, an electrostatic head or any electrode adapted to interact with the authentication marker. Application of the first electrical field changes the blocking display state 322 of the display medium 320 by electrophoresis and thereby causes the message 315 to appear. As described above, the change in display state may be a change in the inductance of the display medium 320. Further, as described above, the message may appear as a result of a change in an optical property of the display medium, such as color, reflectivity or luminescence. As described above, the message may also appear as a result of producing an electrophoretic shutter effect in the display medium 320 to achieve a transmissive state which reveals, for example, a message disposed on the surface 350 of the object.

RESPONSE

Objection to Drawings

FIG. 7C is objected to in the Office Action as not showing element 310 as dictated by the written description. Applicants hereby amend the written description to direct the reader's attention to FIG. 7B for a graphic representation of element 310. Applicants note that because 310 is below the element 320, a top view as shown in FIG. 7C is hard to depict the location of element 310. However, FIG. 7B, which is a side view, shows element 310, and Applicants submit that the objection to drawings should be reconsidered and withdrawn in view of the amendment to the written description.

Claim Amendment

Claims 1, 25, 26, 30, and 43-45 are amended by the present Amendment. Upon entry of the present Amendment, claims 1-46 are pending and presented for reconsideration. Applicants respectfully submit that no new matter is introduced by the present Amendment. A marked-up copy of the amended claims, and a clean copy of all pending claims, as amended herein, are attached.

Support for the amendments, besides those of a formal nature, may be found in the Specification at, for example, page 17, line 21 to page 20, line 3.

Status of Claims

Claims 1-46 are pending in the Application and presented for reconsideration.

Claims 1-3, 10, 16-21, and 23 have been rejected as anticipated under 35 U.S.C. § 102(b) by United States Patent Serial No. 4,707,593 to Murata *et al.*("Murata"). Claim 43 has been rejected as anticipated under 35 U.S.C. § 102(b) by United States Patent Serial No. 4,544,834 to Newport *et al.* ("Newport").

Claims 4, 6-8, 11-15, 26-28, 30-38, 40, 44, and 45 have been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of United States Patent Serial No. 5,786,875 to Brader

et al. ("Brader"). Claims 29, 41, 42, and 46 have been rejected under 35 U.S.C. § 103(a) as obvious over United States Patent Serial No. 5,930,026 to Jacobson *et al.* ("Jacobson") in view of Brader. Claims 5, 9, and 24 have been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of Jacobson. Claim 22 has been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of United States Patent Serial No. 5,194,852 to More *et al.* ("More"). Claim 39 has been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of Brader and More. The Office Action does not discuss claim 25.

Rejections Under 35 U.S.C. § 102

1. Claims 1-3, 10, 16-21, and 23 have been rejected as anticipated under 35 U.S.C. § 102(b) by Murata. Claim 1 is the sole independent claim among those claims.

Amended claim 1 recites an object having an associated authentication marker. The object has a first surface with an authentication marker disposed on the first surface. The authentication marker includes an electrophoretic display medium having a display state, a first surface, and a second surface, and a plurality of electrophoretic particles disposed between the first and second surfaces. The authentication marker further includes a first electrode disposed adjacent the first surface of the electrophoretic display. The display state changes as a result of movement by the electrophoretic particles in response to an electric field applied through the first electrode and to the display medium.

Murata describes a magnetic card with a display cell housing a mixture of magnetic particles and translucent fine fluidizing powder between a magnetic recording layer at the bottom and a transparent cover on the top. See Murata, Abstract; and col. 2, lns. 10-16. The display image is formed when a standard magnetic head magnetizes an alphanumeric pattern, corresponding to a video information, on the magnetic recording sheet, which in turn, attracts colored magnetic particles downward to the magnetized pattern. See Murata, col. 2, lns. 17-22, lns. 57-63; and col. 5, lns. 27-45. The fine fluidizing powders prevent electrostatic attraction between magnetic particles or between the magnetic particles and the display walls. See Murata, col. 2, lns. 1-9, and 24-56.

Without acquiescing to the Examiner's characterization of Murata, Applicants have amended claim 1 to recite the claimed invention with more particularity. Specifically, claim 1 has been amended to recite that the display state changes as a result of movement by electrophoretic particles in response to an electric field applied through the first electrode and to the display medium. In contrast, electric current is only used in Murata's magnetic card when "[a] multitrack head is supplied with a current which is related to the conversion of the video information to an alphanumeric pattern, thereby forming image areas that produce the intended alphanumeric pattern on the track 10." Murata, col. 5, lns. 31-36. In other words, electricity is only used to convert video information and magnetize an area of the magnetic recording layer. "Magnetic particles then are attracted to the image areas, thereby producing a visible image of the magnetic particles which corresponds to the video information ..." Id, col. 5, lns. 36-39. No electric field is actually applied to the display medium in Murata. And no change in display state results from movement by electrophoretic particles in Murata. In fact, the essence of Murata's invention is using *translucent* powders to reduce electrostatic charges, called triboelectricity, among colored magnetic particles or between the magnetic particles and the cell walls. See, id, col. 2, lns. 49-56.

Accordingly, Murata at least does not teach or suggest two limitations explicitly recited in amended claim 1: (1) that an electric field is applied to a display medium; (2) that the display state changes as a result of movement by electrophoretic particles. Therefore, Applicants respectfully request that the rejection under 35 U.S.C. § 102, regarding claim 1, and its dependent claims, be reconsidered and withdrawn.

2. Claim 43 has been rejected as anticipated under 35 U.S.C. § 102(b) by Newport.

Claim 43 recites a method for authenticating an object. Limitations corresponding to those amended to claim 1 have been added to claim 43, namely, applying an electric field to a display media, and to effect a change in display state through movement of electrophoretic particles.

Newport describes a portable credit device with an electrochromic cell display and using "a transition metal oxide that can color cathodically by reduction or anodically by oxidation." See, Newport, Abstract.

Newport does not teach the use of electrophoretic particles in a display media, or further applying an electric field to effect a change in a display state through movement of the electrophoretic particles, both limitations explicitly recited in amended claim 43. Two sections of Newport are cited in the Office Action as teaching applying electrical signals to change the display state of an authenticating marker: column 3, lines 42 and 43, and column 2, lines 47-49. However, uses of electricity in those cases, according to Newport, are limited to "liquid crystal devices, light emitting diodes or electrochromic cells." Newport, col. 3, lns. 36-38. None of those devices effects a change in the display state through electrophoresis, namely, migration of electrophoretic particles towards or away from an electrode as a result of an applied electric field. See, Application, pg. 17, lns. 26-28 (describing electrophoresis). Neither does Newport suggest any modification to incorporate mobile and migratory particles, because its invention is based on color changes in the cathode and anode, both stationary electrodes in the display. See, Newport, col. 4, lns. 10-33.

Accordingly, Newport at least does not teach or suggest two limitations explicitly recited in amended claim 43: (1) providing an authenticating marker comprising a plurality of electrophoretic particles; (2) applying an electric field to effect a change in the display state through movement of electrophoretic particles. Therefore, Applicants respectfully request that the rejection under 35 U.S.C. §102, regarding claim 43, be reconsidered and withdrawn.

Rejections Under 35 U.S.C. § 103

1. Claims 4, 6-8, 11-15, 26-28, 30-38, 40, 44, and 45 have been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of Brader. Among those claims, claims 26, 30, 44, and 45 are independent claims. Claims 4, 6-8, 11-15 each depend from claim 1. Claims 27 and 28 both depend from claim 26. Claims 31-38 and 40 each depend from claim 30.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). MPEP 706.02(j).

Brader describes how to use thermoelectric elements to transition liquid crystal molecules from one optical state to another. See Brader, Abstract.

(a) As discussed in the previous section, Murata at least does not teach or suggest two limitations explicitly recited in amended claim 1: (1) that an electric field is applied to a display medium; (2) that the display state changes as a result of movement by electrophoretic particles. Brader does not cure these deficiencies. First, Brader's teaching is limited to a thermally addressable display as its invention is based on depositing electrically resistive ink to form thermoelectric elements that can, in turn, cause the optical state of such a display to change. See Brader, col. 3, lns. 25-43. In FIG. 1 of Brader, such thermoelectric elements are illustrated as pixels 20a, 20b, and 20c. See, id, col. 3, lns. 60-65. Notice each pixel, 20a, 20b, or 20c, superimposes a pair of electric contact points 14a and 14b on the circuit layer 10, which forms a full electric circuit through conductive leads 12a and 12b. See, id, FIG. 1; and col. 3, lns. 53-65. Therefore, no electric field is applied to the display medium (light shutter layer 36) in Brader's liquid crystal display ("LCD"). See, id, col. 4, lns. 21-33 and col. 2, lns. 64-67 ("thermally conductive relationship").

Second, Brader does not teach or suggest the use of electrophoretic particles. Since Brader's invention is based on use of thermoelectric elements, the display particles necessarily have to change the optical state of the display under different thermal conditions. Certain types of liquid crystals, according to Brader, are particularly suitable for use in Brader's display as their

optical state varies as a function of temperature. See, id, col. 1, lns. 23-32; and col. 2, lns. 47-67. In contrast, Brader is completely void of any suggestion that similar properties can be found in electrophoretic particles, nor can one find such suggestion in the general knowledge in the art.

Accordingly, even if the disclosures of Murata and Brader are combined, the propriety of which is questionable since Murata describes a magnetically addressable display whereas Brader describes a thermally addressable display, all the limitations of the presently amended claim 1, and of its dependent claims including claims 4, 6-8, 11-15, are not taught or suggested. Therefore, a *prima facie* case of obviousness against these claims can no longer be made.

(b) Without acquiescing to Examiner's rejection, Applicants have amended claim 26 to recite the claimed invention with more particularity. Specifically, claim 26 has been amended to recite that the electrophoretic display medium comprises a plurality of electrophoretic particles, and that the first display state changes to reveal a message as a result of movement by the electrophoretic particles in response to a first electrical signal communicated to a conductive substrate.

As described above in detail, neither Murata nor Brader teaches or suggest changing a display state as a result of movement by electrophoretic particles. Accordingly, even if the disclosures of Murata and Brader are combined, all the limitations of the presently amended claim 26, and of its dependent claims 27 and 28, are not taught or suggested. Therefore, a *prima facie* case of obviousness against these claims can no longer be made

(c) Without acquiescing to Examiner's rejection, Applicants have amended claims 30, 44, and 45 to recite the claimed invention with more particularity. The added limitations are similar to those added to claim 26 and require the display to include a plurality of electrophoretic particles, and that electrophoretic movement by those particles leads to changes in a display state. As described above in detail, neither Murata nor Brader teaches or suggests changing a display state as a result of movement by electrophoretic particles. Accordingly, even if the disclosures of Murata and Brader are combined, all the limitations of the presently amended claims 30, 44, and

45, and of their dependent claims 31-38, and 40, are not taught or suggested. Therefore, a *prima facie* case of obviousness against these claims can no longer be made.

2. Claims 29, 41, 42, and 46 have been rejected under 35 U.S.C. § 103(a) as obvious over Jacobson in view of Brader. Among them, claim 29 depend from amended claim 26, claims 41 and 42 both depend from amended claim 30, and claim 46 is an independent claim.

Jacobson describes, among other things, use of piezoelectric elements to power non-emissive displays. See Jacobson, Abstract.

(a) Claim 29 depends from amended claim 26, which, in turn, recites a secure document with a conductive substrate that has a message on its surface. With different electrical signals communicated to the substrate, an electrophoretic display medium changes its display state to either reveal or obscure the message through electrophoresis. Jacobson does not teach or suggest revealing or obscuring a document. The Office Action states that it would have been obvious to one of ordinary skill in the art to use the non-emissive display of Jacobson as a substitute for the display of Brader because fewer layers need to be fabricated as compared to the LCD of Brader. Applicants respectfully traverse.

As described above in detail, Brader describes how to use thermoelectric elements to transition liquid crystal molecules form one optical state to another. It constructs many layers out of necessity to practice its invention. For example, referring to FIG. 1, a white layer 22, and color layers 24, 28, and 32 are needed for constructing a full-color display in Brader because liquid crystal molecules are not dye-based, and need color filters or colored light to effect a full-color display. See Brader, col. 4, lns. 3-20; see also, id, col. 2, lns. 24-37. Brader's invention is based on the use of thermoelectric elements for addressing a pixel, and therefore, the particles useful in Brader's display must exhibit varying optical states as a function of temperature. Brader does not provide the slightest hint that electrophoretic particles possess such properties. Nor can one find such suggestion in the general knowledge in the art.

Accordingly, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available in the art, to combine the reference teachings. Further, there is no reasonable expectation of success for constructing the electrophoretic display as taught in Jacobson using the thermoelectric element taught in Brader to hide or illuminate a message. As a result, a *prima facie* case of obviousness against claim 29 has not been made.

(b) Claims 41 and 42 depend from amended claim 30, which, in turn, recites a secure document with a substrate that has a message on its surface. With different electrical signals communicated to an adjacent electrode, an electrophoretic display medium changes its display state to either reveal or obscure the message through electrophoresis. As discussed in the immediately preceding section, there is no suggestion or motivation to combine the teachings of Jacobson and Brader to construct the document as recited in claims 41 or 42. Neither is there reasonable expectation of success for such a combination. Accordingly, a *prima facie* case of obviousness against claims 41 and 42 has not been made.

(c) Claim 46 recites a method for securing a document. The method includes steps of providing a substrate that has a message on its surface, and disposing a shield on the surface. The shield includes a first clear electrode, an electrophoretic display medium and a second electrode. The message is shielded when an electrical signal is communicated to the first clear electrode and the second electrode. For the same reasons as discussed above, there is no suggestion or motivation to combine the teachings of Jacobson and Brader to devise the method as recited in claim 46. Neither is there reasonable expectation of success for such a combination. Accordingly, a *prima facie* case of obviousness against claim 46 has not been made.

3. Claims 5, 9, and 24 have been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of Jacobson.

All three claims depend from amended claim 1, which, in turn, recites an object having an associated authentication marker. The object has a first surface with an authentication marker disposed on the first surface. The authentication marker includes an electrophoretic display

medium having a display state, a first surface, and a second surface, and a plurality of electrophoretic particles disposed between the first and second surfaces. The authentication marker further includes a first electrode disposed adjacent the first surface of the electrophoretic display. The display state changes as a result of movement by the electrophoretic particles in response to an electric field applied through the first electrode and to the display medium.

On one hand, as discussed in detail under the section on § 102 rejections, Murata at least does not teach or suggest two limitations explicitly recited in amended claim 1: (1) that an electric field is applied to a display medium; (2) that the display state changes as a result of movement by electrophoretic particles. Jacobson, on the other hand, does not teach or suggest an authentication marker on a first surface of an object.

Murata's display relies on magnetic attraction between magnetic particles and a magnetized area. The essence of Murata's invention is the use of translucent fine powders to reduce electrostatic charges among colored magnetic particles to maker the image sharper. See Murata, col. 2, lns. 49-56. Therefore, it teaches away from using electrophoretic particles that move in response to an applied electric field. Accordingly, there is no suggestion or motivation to combine the teachings of Murata and Jacobson to devise the object as recited in amended claim 1. Neither is there reasonable expectation of success for such a combination. Therefore, a *prima facie* case of obviousness against claims 5, 9, and 24 has not been made.

4. Claim 22 has been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of More.

Claim 22 depends from amended claim 1, which, in turn, recites an object having an associated authentication marker. The authentication marker includes an electrophoretic display medium having a display state that changes as a result of movement by electrophoretic particles. As described above in detail, Murata does not teach or suggest at least that the display state changes as a result of movement by electrophoretic particles. More describes a portable interactive data input pen and its use with an LCD. More does not teach or suggest the use of

electrophoretic particles, and therefore, fails to cure the deficiency of Murata with regard to amended claim 1, and its dependent claim 22. Therefore, a *prima facie* case of obviousness against claim 22 has not been made.

5. Claim 39 has been rejected under 35 U.S.C. § 103(a) as obvious over Murata in view of Brader and More.

Claim 39 depends from amended claim 30, which, in turn, recites a secure document with a substrate that has a message on its surface. With different electrical signals communicated to an adjacent electrode, an electrophoretic display medium changes its display state to either reveal or obscure the message through electrophoresis. As described above in connection with amended claim 30, the combination of Murata and Brader, regardless of the propriety of the combination, fails to teach or suggest at least changing a display state as a result of movement by electrophoretic particles. More does not teach or suggest the use of electrophoretic particles, and therefore, fails to cure this deficiency. Accordingly, a *prima facie* case of obviousness against claim 39 has not been made.

For the above reasons, Applicants respectfully submit that all the claims rejected under 35 U.S.C. § 103 are not obvious in view of the cited references and respectfully request that all the rejections be reconsidered and withdrawn in view of the arguments and amendments.